

Diagnosing an acutely injured knee

Patients presenting with an acutely injured knee often appear in GP surgeries. Sorting out what has happened can be a challenge.

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Most acute knee injuries can be diagnosed following a careful history and thorough examination.



The key elements of a patient's history that will lead the doctor to the most likely diagnosis include the mechanism of injury, the development of pain, the presence of swelling, instability or locking, and the response to treatment.

History and mechanism of injury

A history of an acute injury, either contact or non-contact, is most commonly associated with ligament tears, in particular anterior cruciate ligament (ACL) tears and medial collateral ligament (MCL) tears. However, they can also be associated with meniscal tears.

In the case of a non-contact ACL injury, the history is usually of a patient playing sport with the foot planted, attempting a side-stepping manoeuvre.



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Occasionally the patient may describe a hyperextension injury or a quadriceps active mechanism when the pop occurs as they jump into the air.

An injury to the knee when it is in a valgus position, usually involving a direct blow, may result in a tear to the MCL.

Meniscal tears often occur as the result of pivoting or twisting of a knee. They may also develop as an overuse injury.

Features of the pain

Meniscal tears are most often associated with localised pain over the joint line and movement restrictions, causing the patient to limp and experience pain on

squatting. Mechanical symptoms such as locking or catching are also usually indicative of an underlying meniscal tear. Swelling may or may not be present.

ACL tears occur acutely, and are associated with severe pain and swelling of the knee, greatly restricting the affected person's ability to weight-bear.

Most sportspeople are unable to continue playing their sport after the injury.

An injury to the MCL is also commonly associated with acute pain and swelling. In addition, it produces pain along the length of the ligament with weight-bearing and when the knee is in valgus stress.

Other possible injuries to the knee include lateral collateral ligament rupture, posterior cruciate ligament tears, patellar tendon rupture, and fractures.

However, these are less common than the conditions described above and usually occur in conjunction with other injuries.

Examination

Initial examination of the knee should include assessment of the patient's gait, whether they have obvious limited movement and whether they have pain on squatting.

The knee should then be palpated to determine the presence of an effusion. There will always be swelling with a chondral injury, but not always with a meniscal tear.

Examination soon after an acute knee injury is often difficult if the knee is painful and swollen, and unable to be flexed or extended to the degree required for an accurate examination.

If the swelling and pain is extreme, the patient should employ RICE until such time as the symptoms subside and a more accurate assessment of the knee is possible.

On examination, it is important to ensure that the patient is relaxed.

In order to obtain relaxation, the patient is asked to rest their head on a pillow, with their arms by their sides. It may be useful to gently roll the thigh in and out to get the muscles to relax.

Placing a pillow below the knee is often more comfortable for the patient.

Joint line tenderness, palpated with the knee bent to 90 degrees, may be present in a meniscal tear, but it is not a very specific sign.

Damage to a collateral ligament will often result in tenderness on palpation over the affected ligament.

Examination can be complicated by injury to more than one structure within the knee, such as a torn MCL as well as a ruptured ACL (which provides resistance to valgus stress in full extension) or posterolateral structures.

This should be suspected in patients with a history of a high-impact injury.

Specific tests for meniscal tears

McMurray's test

With the patient supine, bend the knee and twist the foot (internal and external rotation). A click (and often pain) is felt at the joint line as the knee is brought into flexion in patients with a torn meniscus.

Thessaly test

The patient stands on their affected foot, holding onto the examiner, with outstretched hands, for balance. The patient flexes their knee to about 30 degrees and internally and externally rotates (twists) three times. Medial or lateral joint line discomfort or a sense of locking or catching constitutes a positive test.

Specific tests for ACL tears

Lachman test

The knee is unlocked in 30 degrees of flexion with the heel resting on the couch. The examiner holds the patient's tibia, with the thumb on the tibial tubercle.

The examiner's other hand is placed on the patient's thigh, a few centimetres above the patella. Placing the patient's leg under the examiner's thigh can help control the femur, especially in larger patients.

The tibia is then pulled forward in a brisk, forceful motion.

If the movement of the tibia on the femur comes to a sudden stop, this is described as a firm endpoint. The quality of the endpoint at the end of the movement is described as either "firm" or "soft" and is always compared to the other knee.

A firm endpoint results from the sudden tensioning of the ACL. A soft endpoint almost always indicates a torn ACL.

The patient will usually be aware of the difference between the firm endpoint in the healthy knee and the soft endpoint in the knee with the torn ACL.



The Lachman test

Active resisted extension

In obese patients, those with bulky muscles or a large effusion, it may be difficult for the examiner to conduct a Lachman test. In such cases, an alternative means of assessing the ACL involves the examiner placing a fist under the knee, holding the ankle against the couch with the other hand, and asking the patient to lift their leg against resistance.

This will move the tibial tubercle significantly forward in patients with a torn ACL, especially compared with the contralateral, intact knee. This is a useful screening test, however, it takes some practice to appreciate the anterior translation of the tibia, which can sometimes be subtle.

Pivot shift

The pivot shift test involves stress applied to the knee in valgus and flexion, with or without internal rotation. A shift indicates that the ACL has ruptured. Sometimes, though, the ACL may be deficient without a pivot shift occurring.

To perform the test, the patient is supine with the examiner positioned on the affected side. The patient's foot is held in very slight internal rotation while with the other hand the examiner applies a valgus stress to the posterolateral aspect of the proximal calf. At this point, flexion is started.

The lateral tibial plateau will be seen to sublux forwards during the first degrees of flexion. As flexion progresses, the anterolaterally subluxed tibia will suddenly reduce, at 30 degrees of flexion. This reduction is associated with a characteristic 'clunk' in patients with a ruptured ACL.



The pivot shift test.

Anterior drawer in 90° flexion or direct anterior drawer

The examiner sits on the patient's foot, which has been placed in neutral position with the knee in 90° flexion. The hamstrings are checked to be relaxed, while the other fingers encircle the upper end of the tibia and pull the tibia forwards.

If a direct anterior drawer is obtained, the ACL will be torn. However, for this sign to be elicited, peripheral structures such as the medial meniscus or the meniscotibial ligament must also be damaged.

This ligament forms a wedge, in 90° flexion, preventing anterior tibial translation. The finding of an anterior drawer is conclusive evidence of an ACL tear. However, not every ACL tear will be associated with a positive anterior drawer test.



The anterior drawer test.

Examination for MCL injury

Assessment of the knee under valgus stress will accurately and reliably determine MCL stability, provided the knee can be flexed and extended adequately.

Valgus stress test

The valgus stress test is conducted in two stages.

In stage one, the knee is held in full extension and a valgus stress is applied by pulling on the tibia while pushing on the femur. An isolated superficial MCL injury does not cause laxity. Only an injury involving the entire MCL complex or combined with an ACL tear will cause significant valgus laxity with the knee in full extension.

The second stage of the test involves the examiner applying the same valgus stress, but with the knee flexed to 30 degrees. In this position, any asymmetry is considered a positive finding.

Medial laxity of 3-5mm compared with the contralateral knee indicates an injury to the superficial MCL.

Increasing laxity is a sign of progressive injury to the posteromedial aspect of the knee and the cruciate ligaments.

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MCL injury grading

MCL injuries are classified according to the extent of damage to the ligament and the degree of instability conferred. A grade I injury involves a microscopic tear of the superficial or deep MCL with no resultant instability or laxity.

Grade II injury describes an incomplete tear with gross disruption of fibres of the superficial or deep MCL. There is a definite endpoint to valgus stressing at 30 degrees of flexion, but there may be 5-15 degrees of valgus instability. There is no instability in full extension and no rotational instability.

A grade III injury indicates a complete tear of the MCL complex. Valgus stress at 30 degrees demonstrates more than 15 degrees of instability. There may also be instability in full extension or rotational instability. There is a loss of the valgus endpoint.

Management

X-ray is always the first investigation to exclude a fracture or bony avulsion. MRI is the next investigation where a soft tissue injury is suspected. CT scanning is used before an MRI if a fracture is suspected.

The decision to refer knee injury for surgical assessment depends on factors such as pain, disability, instability and patient expectations. Very few of these injuries require emergency surgery.

In general, most ACL ruptures and severe meniscal tears require surgical assessment and management, while most MCL injuries and minor meniscal tears can be treated conservatively.

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